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PROFESSOR E. F. NICHOLS, of Colgate University, has accepted a call to the chair of physics at Dartmouth College.

DR. C. M. BAKEWELL, of the University of California, has been appointed associate professor of philosophy at Bryn Mawr College.

THE Frank Small studentship in botany of Gonville and Caius College, Cambridge, will be vacant in June. It may be held for two or three years, and is of the annual value of £100.

THE Aberdeen Universities Court has appointed Mr. John Clarke, M.A., Aberdeen, to be lecturer in education for the term of three years, in succession to Dr. Joseph Ogilvie, whose term of office has expired.

DISCUSSION AND CORRESPONDENCE.

SPIRITUALISM AS A SURVIVAL.

TO THE EDITOR OF SCIENCE: The discussion in SCIENCE in regard to the occult phenomena supposed to be manifested by Mrs. Piper induces me to recall a controversy I had with a distinguished psychologist who expressed the belief that in Mrs. Piper he had, at last, encountered evidences of a supernatural character. In a discussion with a very eminent Englishman, a spiritualist, I found that he placed implicit faith in mediums who had been repeatedly exposed as most arrant humbugs. No intelligent seeker after evidences of supernaturalism would, for a moment, accept the manifestations of these frauds, and yet, with the blandness of an insane person, this eminent spiritualist received, without a reservation, the messages of these humbugs. In the Proceedings of the Society for Psychical Research two eminent psychologists recount the remarkable performances of a medium in Sicily, which they fully accepted as genuine, yet my distinguished psychologist above mentioned, with his keen method of penetrating frauds of all kinds, exposed this apparent wonder. Now he in turn encounters Mrs. Piper and, his limit of penetration having been reached, he falls into line just as promptly as the rest. Here you have, then, a number of men with varying degrees of penetrating powers. One set all agape with speculative wonder, as Huxley said of Bastian, accepting stuff as genuine which many alert

newspaper reporters had shown to be spurious; another set, endowed with a modicum of common sense, repudiating the peripatetic mediums yet snared by more skillful frauds; still higher are others who are not deceived by these, but are in turn bamboozled by more deftly played tricks; and finally the highest intellects who, in an encounter with some exceedingly adroit female medium, are puzzled by the manifestations and, not having that judicious calm which might frankly wait for more light, plunge into the regions of the occult for an explanation as readily as did their more ignorant confrères under the capers of the charlatans. I think a fair explanation of this attitude of the human mind, which always excites more wonder in a rational being than do the séances of cunning mediums, is that we have clearly before us the evidences of survival. From a time when all believed in omens, portents, dreams, warnings, etc., what wonder that a sufficient number of molecules have been transmitted whose potency overrides common sense. In no other way can we explain why in the latter years of the nineteenth century there are in our midst men, otherwise intelligent, who fully believe in astrology. It is as utterly impossible to convince people thus afflicted as it would be to argue with inmates of an insane asylum. We may regard with interest, akin with pity perhaps, those who waste their phosphorus in trying to convince the world that they are right. We are compelled to explain their attitude, not by significantly striking our head with the index finger as we contemplate them, but by insisting that they present most interesting examples of survival, and, if they did but realize it, how interesting they would be to themselves!

The conception of a flat world was at one time universal; to the masses, however, the demonstration that it was round or square or pyramidal induced no special mental disturbance—no more, indeed, than when it was shown that the air they breathed was composed of certain gases, had a certain weight, etc. The belief in dreams, omens, signs, etc., was an active one; it was invoked at all times; the mind, for centuries, was super-saturated with it, and hence its survival among children, today, among the masses and, rarer still, among

the highly gifted. The question of flatness of the world had, with the masses, hardly an existence; no molecules of the brain were exercised by it; the disturbance occurred only among the learned. Is it for this reason that we find so few survivals, to-day, of those who believe the world is flat?

EDWARD S. MORSE.

SALEM, May 17, '98.

'THE NEW PSYCHOLOGY.'

TO THE EDITOR OF SCIENCE: Professor Stanley's interesting letter is timely and valuable; it calls attention to a fundamental difference in standpoint between two schools of psychologists. This difference has been indicated by Professor Cattell in the following statement: "As a science advances beyond the stage of crude observation it tends to become either quantitative or genetic." The former tendency has produced experimental psychology; the latter genetic psychology.

The standpoint of experimental psychology—as far as I can understand the principles of its representatives—can be briefly stated as follows: *Given a group of phenomena, called 'phenomena of consciousness,' required a determination of the laws according to which these phenomena are connected.* This is a problem similar to that of astronomy, physics, meteorology, geology, biology, political economy—in fact, of all the sciences. In the early stages of a science the only solutions possible are those of 'yes' and 'no;' *e. g.*, does the memory of an object improve with interest and the lapse of time? to which the answers are: 'yes' for the former and 'no' for the latter. The introduction of methods of measurement—which is the special achievement of the new psychology—renders quite a different solution possible. The question just stated becomes: *how* does the memory of an object depend on interest and the lapse of time? The answer is as follows: Denote all the possible factors that may influence the memory by $a, b, c, \dots, i, \dots, t, \dots, x$. *Keeping all the circumstances except i constant*, determine the relation of dependence of the memory on i , which is simply a roundabout method of saying: Let $a, b, c, \dots = \text{const.}$ and find $M=f(i)$, where

M is the accuracy or uncertainty or some other property of memory in the particular case. The method of solution, familiar to all experimentalists (see p. 77 of 'New Psychology'), consists in varying i quantitatively and measuring the resulting variations in M ; the results when properly treated give a formula connecting the two; this is known as a law of memory. The fundamental necessity for such work is the method of measuring the quantities considered.

Professor Stanley remarks: "We must first devise some method of measuring interest;" it follows that we cannot determine this law of memory because such a method has not been found. This is quite true; the proper reply is to devise such a method—an undertaking not difficult to any one trained in psychological experiments. We can, however, measure time, and have in a number of cases (Wolfe, Ebbinghaus) determined the laws of various kinds of memory as depending on time or $M=f(t)$. The ideal solution—which Professor Stanley seems to expect at the start—is $M=F(a, b, c, \dots, i, \dots, t, \dots, x)$ or the determination of the complete law of memory as depending on every possible circumstance. Perhaps some day psychology will make some approximation to such a solution; at present it must remain content with determining single laws.

Professor Stanley is quite wrong in assuming that this method is peculiarly a physical method. It belongs no more to physics than to chemistry (see the late works on mathematical chemistry), to political economy (Carnot, Jevons, Fisher), to biology (Pearson). It is merely a fundamental method of thought which is applicable wherever measurements can be made. In fact, we can reply to Professor Stanley that his science of genetic psychology must inevitably come to the use of this very method. Every single factor influencing the life of an individual or a community acts to a degree depending on its intensity according to some law; supposing all other factors to remain constant, this law is given by its action under those circumstances. By carefully measuring the action of each factor and its result on each property of mental life, the genetic psychologist could state the result as a series of laws of mental development. To be sure, this is rather a difficult task to propose,